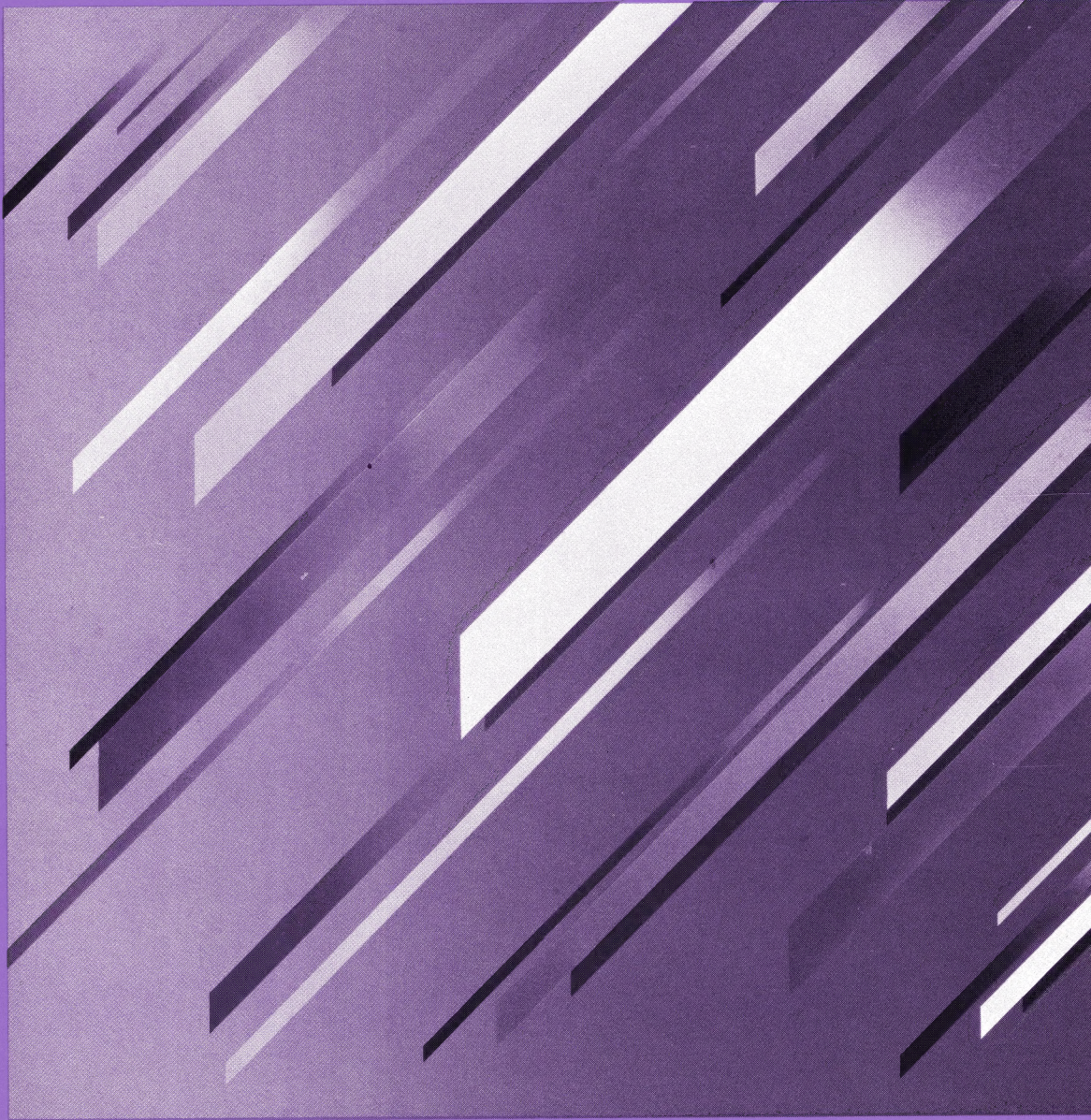


# Getting Started With OS-9







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# **GETTING STARTED WITH OS-9**

## **OS-9 OPERATING SYSTEM**

**For The 64K TRS-80 Color Computer  
includes an Editor and Assembler**

**Radio Shack®**  
A DIVISION OF TANDY CORPORATION  
FORT WORTH, TEXAS 76102

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# To Our Customers . . .

---

Congratulations on purchasing the OS-9 Disk Operating System for your 64K TRS-80 Color Computer. You'll find OS-9 powerful and simple to use. It is structured after the famous UNIX operating system that is used at many colleges and universities today.

## How to Use This Manual . . .

This manual is written for beginners although experienced programmers will also find it useful in starting up OS-9. It explains the important things you need to know:

- How to run an easy test on your disk drives.
- How to start OS-9.
- How to use important commands.
- What to do in case of trouble.

For more detailed information on OS-9, you can read these OS-9 manuals:

*OS-9 Commands.* Explains the concepts and commands of OS-9.

*OS-9 Program Development.* Explains how to use:

- OS-9's text editor to enter programs or to prepare text such as letters and documents.
- OS-9's Assembler.\*
- OS-9's Interactive Debugger to debug your assembly language programs.\*

*OS-9 Technical Information.* Provides all the information necessary to install, maintain, expand or write assembly-language programs for OS-9.\*

\*These manuals assume that you are familiar with the 6809 architecture, instruction set, and assembly language.





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# 1 / WHAT IS OS-9?

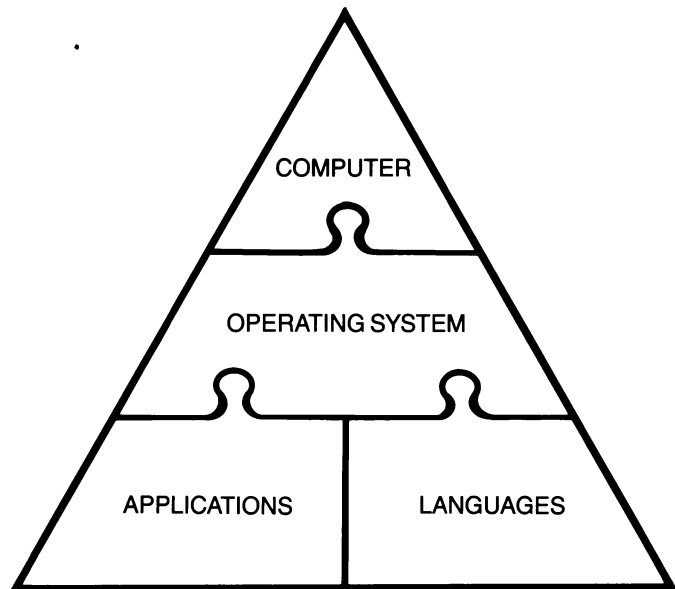
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What is OS-9? That's a simple question with an interesting answer. However, before you can understand OS-9, you need to understand operating systems.

## What Is an Operating System?

An operating system acts as a manager for the computer. It sends information to the disk drives, printers and video. It manages the storage space on the disks and in memory. It also answers your commands.

This illustration shows the relationship between the operating system and the hardware. (Hardware is the computer, drives and printer.) It also shows how application programs and languages fit into the picture.



**Application Programs** are practical uses for the computer, such as creating and maintaining a mailing list.

**Languages** let you write your own application programs.

---

## Back To OS-9

OS-9 is a versatile operating system for the 64K TRS-80 Color Computer. It is based on the UNIX operating system developed by Bell Laboratories Inc. UNIX is widely used on larger computers especially in colleges and universities.

OS-9 opens many new doors by expanding the Color Computer's capabilities. OS-9 offers sophisticated features that are normally available only in much larger computers. Among these are:

### Multi-Level Filing System

Like most operating systems, OS-9 lets you store information on disk in a "file" and index these files with a directory. OS-9, however, goes one step further by letting you create a hierarchy of directories and files.

### Multiuser/Multitasking Operation

Multiuser means that more than one person can use the system at the same time. The number of users is limited by the number of terminals. The TRS-80 Color Computer can have one terminal; this means that two people can use OS-9 at the same time. One person on the Color Computer and one on the terminal.

Multitasking means that two or more tasks (programs) can run at the same time. For example, with OS-9 you could print reports and enter information at the same time.

### Device-independent Input/Output System

OS-9 uses a very efficient method for inputting and outputting information. It expects all input to come from the "standard input device" and all output go to the "standard output device." On the Color Computer, OS-9 expects all input to come from the keyboard/console and all output to go to the video display.

---

You can easily “redirect” the standard I/O devices to other devices such as printers or disks. This means that an OS-9 program needs only one output routine and one input routine. From there you can redirect them to another device. This saves time for the programmer and space on the disk because programs can be shorter.

This manual provides step-by-step instructions for getting OS-9 started on your Color Computer. It includes a sample session to help you become familiar with some of the most common OS-9 commands and features. We do not cover all OS-9 features here, but you can find detailed information in the other OS-9 manuals.

To run OS-9, you must have a 64K TRS-80 Color Computer that has at least one floppy disk drive. The OS-9 standard system disk includes modules to support the following TRS-80 Color Computer hardware:

- 64K RAM
- Keyboard
- Alphanumeric Video Display
- Color Graphics Display
- Disk Drives (1 or 2)
- Joysticks (1 or 2)
- Serial Printer\*
- RS-232C Communications Port

\* Optional supported hardware

We hope you enjoy your journey with OS-9!





## 2 / BEFORE YOU START OS-9

---

Before you start OS-9, we suggest you run a simple test program to make sure your disk drives are still well “tuned.” This test checks the speed of the drive. A disk drive speed should be about 300 RPM (rotations per minute). Even though we submit our disk drives to a rigorous quality assurance test before they are sent to you, the drive speed may begin to vary after use. This makes disks harder to read.

You can check your drive’s speed at home with the following procedure:

1. Make sure that the disk system is properly connected to the computer. Turn on the TV. Next, turn on the computer and disk drives.
2. Insert the disk labeled OS-9 BOOT into Drive 0.
3. At the OK prompt, type:

```
.  
  RUN "*" ENTER
```

This starts the OS-9 Utility program.

4. The screen shows:

```
b BOOT OS9  
t TEST DISK DRIVE
```

Press **T** to start the disk drive test.

5. The test program prompts:

```
***SELECT DRIVE 0 - 3 OR "BREAK"***
```

Enter a **0** to test Drive 0.

- 
6. The screen shows the drive speed. The speed may change slightly during the test; this is normal. This test accepts speeds from 298.0 to 303.5 rpm. If the speed is in this range, the screen continues to display the speed.

If the speed is unacceptable, the screen changes color and displays one of these messages:

DISK SPEED NEEDS ADJUSTING, TOO FAST

or

DISK SPEED NEEDS ADJUSTING, TOO SLOW

If one of these messages appears, take your disk drive to your Radio Shack Service Center for adjustment.

To exit the test, press **BREAK** and the test prompt reappears. If you have only one drive, remove the OS-9 BOOT disk and place it in its protective sleeve.

If you have a second drive and wish to test it, remove the OS-9 BOOT disk from Drive 0 and place it in Drive 1. Press **1** at the test prompt, and the screen shows the drive speed. Exit the test by pressing **BREAK** and remove the OS-9 BOOT disk.

Place the disk in its protective sleeve and store it in a safe place. You may want to run this test periodically. How often you decide to run it depends on how much you use your drives.

# 3/STARTING UP OS-9

---

The way to start OS-9 depends on the version of your computer's disk ROM. The version number appears on the first line of the dialog when you start up your disk system:

```
DISK EXTENDED COLOR
BASIC 1.x      <---- Version Number
```

If your computer is Version 1.0, the startup procedure differs from that of Versions 1.1 and later. Versions 1.1 or later have the DOS command, which automatically boots OS-9. Version 1.0 does not and must use a special command.

Be sure your disk system is properly connected. Turn on the TV. Then turn on the disk drives and the computer.

## Starting OS-9 With Version 1.0

1. Insert the disk labeled OS-9 BOOT into Drive 0.
2. At the OK prompt, type:

```
RUN "*" ENTER
```

This starts the OS-9 Utility program.

3. The following appears:

```
b BOOT OS9  
t TEST DISK DRIVE
```

Press **B** to boot OS-9.

4. The boot utility prompts:

```
INSERT OS9 DISKETTE  
INTO DRIVE 0 AND PRESS A KEY
```

Remove the OS-9 BOOT disk and place the OS-9 SYSTEM MASTER disk in Drive 0. Press any key except break and OS-9 starts.

## Starting Up with Version 1.1 or Later

1. Insert the disk labeled OS-9 SYSTEM MASTER into Drive 0.

2. At the OK prompt, type:

```
DOS ENTER
```

This starts OS-9. If the DOS command returns a syntax error (?SN ERROR), be sure you entered the command correctly. If DOS still returns the error, then you probably have version 1.0; use the previous procedure.



---

## Entering the Date

After OS-9 displays its startup message, the time prompts displays:

```
YY/MM/DD HH:MM:SS  
TIME ?
```

Enter the date and time in the form shown. For example:

```
86/03/19 13:22 (ENTER)
```

sets the date as March 19, 1986 and the time as 1:22 pm. Enter the time in 24-hour notation; the seconds (:SS) are optional.

When you enter the date, the OS-9 prompt appears:

```
OS9:
```

OS-9 is now in control and ready to accept a command.

**Note:** You should always keep the OS-9 System Disk in Drive 0 while running OS-9.

## Turning Off the System

Before turning off your disk system, remove all disks from the drives. Turn off the printer (if connected), the disks, the computer and then the TV.



# 4 / FORMATTING DISKS AND MAKING BACKUPS

---

As you know from using the Color Disk BASIC, you need to “format” disks into a “file cabinet” organization before using them. In the same manner, you must format disks before using them with OS-9.

OS-9’s disk format, however, is slightly different from that of the Color Disk BASIC. Because of this, neither can read the other’s disk.

This chapter shows how to format disks so that you can use them with OS-9. It also shows you how to make backup copies of them.

The OS-9 Boot disk uses Color Disk BASIC’s format. To make a backup of it, use the `DSKINI` command to format a blank disk and the `BACKUP` command to make a copy of the Boot disk. Always store your original disks in a safe place.

## Single-Drive Users

1. Be sure your computer and all peripherals (TV, disk drive, printer) are turned on. Start OS-9 as described earlier in the previous chapter.
2. Get a blank disk. Be sure the write-protect notch is *not* covered by a foil tab.
3. At the OS9: prompt, type:

```
format /D0 (ENTER)
```

---

Format displays the message:

```
COLOR COMPUTER DISK FORMATTER 1.2
FORMATTING DRIVE /D0
Y (YES) OR N (NO)
READY?
```

*Remove your OS-9 SYSTEM MASTER disk and place the blank disk in Drive 0. Type Y.*

4. After formatting the disk, Format prompts for a disk name. The name is not important at this point, so enter any letter. For example:

```
S (ENTER)
```

OS-9 begins verifying the disk. The screen shows the track number in hexadecimal notation as it is verified.

5. When the formatting is complete, the OS9: prompt appears.

**Note:** You cannot make a backup on a disk with errors. If any errors occurred during the formatting, try again. Remove the blank disk from Drive 0 and replace the OS-9 SYSTEM MASTER disk. Repeat steps 2-5. If OS-9 still reports errors on the disk, use another disk.

6. Remove the formatted disk from Drive 0 and replace the OS-9 SYSTEM MASTER disk. Type:

```
BACKUP /D0 #40K (ENTER)
```

Backup prompts:

```
READY TO BACKUP FROM /D0 TO /D0
?:
```

Press **(Y)** to begin the backup.

---

7. The following prompt appears:

READY DESTINATION, HIT A KEY

Remove the OS-9 SYSTEM MASTER disk and place the formatted disk (destination disk) in Drive 0. Press any key. OS-9 displays the message:

```
S                <---- (disk name)
  IS BEING SCRATCHED
OK ?:
```

Press **Y** and the backup begins.

8. Backup alternately prompts you to:

READY SOURCE, HIT A KEY

Place the OS-9 SYSTEM MASTER disk in Drive 0 and press any key.

• (source = master disk)

or

READY DESTINATION, HIT A KEY

Place the formatted disk in Drive 0 and press any key.  
(destination = formatted disk)

9. When the backup is complete, the screen displays the number of sectors copied and the number of sectors verified. These numbers should match.

Keep your OS-9 System backup disk in Drive 0. Store the original disk in a safe place. Use it only to make backups.



---

## Two-Drive Users

1. Be sure your computer and all peripherals are turned on. Start OS-9 as described earlier in the previous chapter.
2. Get a blank disk. Be sure the write-protect notch is *not* covered by a foil tab. Insert the disk into Drive 1.
3. At the OS9: prompt, type:

```
format /D1 (ENTER)
```

Format displays the message:

```
COLOR COMPUTER DISK FORMATTER 1.2  
FORMATTING DRIVE /D1  
Y (YES) OR N (NO)  
READY?
```

Press **(Y)**. After formatting the disk, Format prompts you for a disk name. The name is not important at this point, so enter any letter. For example:

```
S (ENTER)
```

OS-9 begins verifying the disk. The screen shows the track number in hexadecimal notation as it is verified.

4. When the formatting is complete, the OS9: prompt appears.

**Note:** You cannot make a backup on a disk with errors. If any errors occurred during the formatting, try again. Remove the blank disk from Drive 0 and replace the OS-9 SYSTEM MASTER disk. Repeat steps 2-5. If OS-9 still reports errors on the disk, use another disk.

5. Type:

BACKUP **ENTER**

Backup prompts:

READY TO BACKUP FROM /D0 TO /D1  
?:

Press **Y**. OS-9 displays the message:

S (disk name)  
IS BEING SCRATCHED  
OK ?:

Press **Y** and the backup begins.

6. When the backup is complete, the screen shows the number of sectors copied and the number of sectors verified. These numbers should match.

Remove your OS-9 SYSTEM MASTER disk from Drive 0 and move the OS-9 System backup disk from Drive 1 to Drive 0. Store the original disk in a safe place. Use it only to make backups.

**Note to Two-Drive Customers:** You can format disks to use in your second drive (data disks) by following steps 1-3. You can store information on the data disk instead of your OS-9 System Disk.

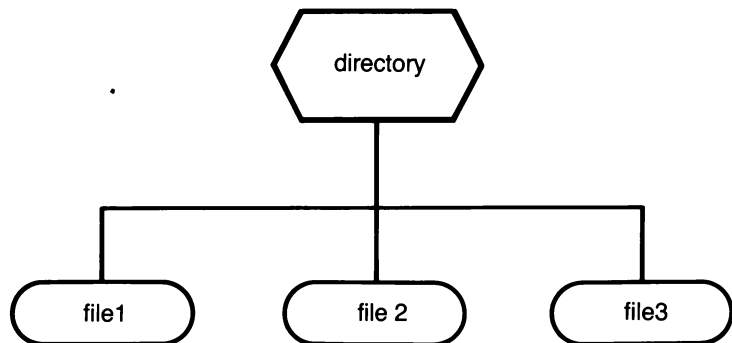


# 5 / EXPLORING THE OS-9 FILE SYSTEM

---

OS-9 stores information in disk “files,” much as you might store a memo or other information in a file folder. The disk files, however, in addition to containing ordinary information such as memos, lists, lines of data, and the texts of documents, can also contain complete programs.

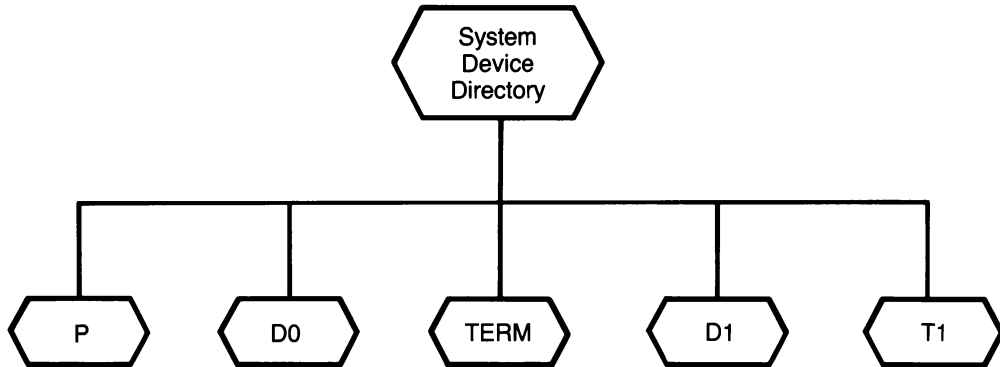
As an aid to organization, OS-9 also gives you the option of collecting groups of files in “directories,” just as in an office you might organize files into categories and group them together in labeled file cabinet drawers. A directory might look like this:



These directories are organized “hierarchically,” similar to a tree or pyramid. This means that each OS-9 directory can contain another directory.

---

The OS-9 system starts at the “system device directory.” This directory contains a directory entry for each device, such as the keyboard/display, disk drives, printer, and optional terminal. The system device directory looks like this:



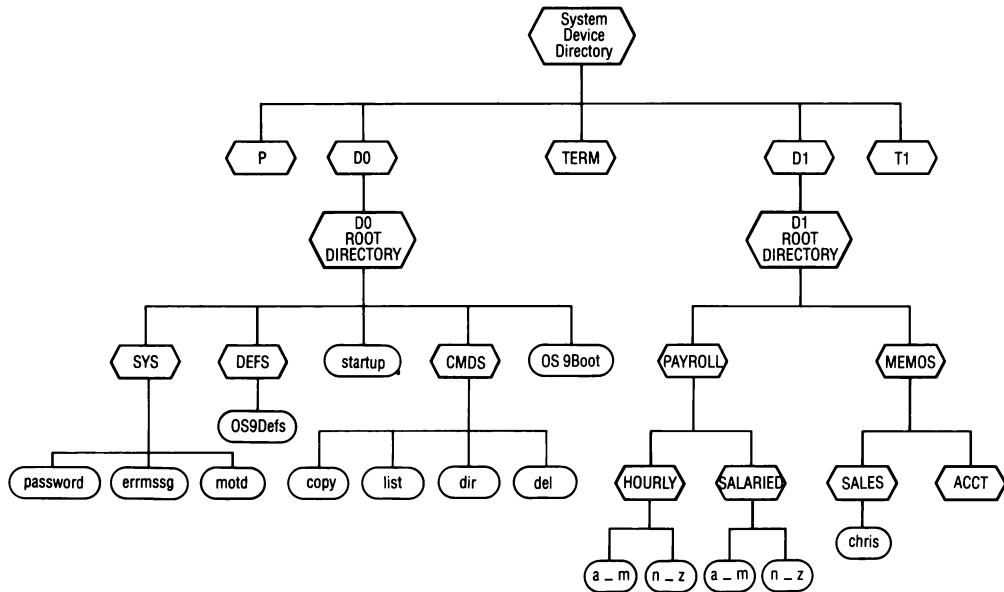
The P is the printer, D0 is the first disk drive, TERM is the keyboard/display, D1 is the second drive, and T1 is a terminal connected to the RS-232C serial port. (Even if you don't have the actual device, your directory still has the entry.)



---

The disk drives, (/D0 and /D1), are the only devices that can form their own “tree” by storing other directories and files. Each drive has a “root” directory which is the beginning of its tree.

The following illustration shows a typical OS-9 System with a disk in both drives:



The disk in Drive 0 is the OS-9 System disk. Its root directory contains two files (startup and OS-9Boot) and three sub-directories (SYS, DEFS and CMDS). The sub-directories contain another level of files. All of these files are necessary to run OS-9.

The disk in Drive 1 is an imaginary data disk containing three levels of directories. OS-9 lets you organize your files with as many levels of directories as you need and have room for.

Notice that all device and directory names are capitalized and filenames are lower-case. This is a customary practice that lets you easily recognize directory names; however, it is not mandatory.

---

Before looking at the OS-9 directory; we suggest you type the following command to get into the upper/lower case mode. (OS-9 normally displays upper-case letters only.) At the OS-9 prompt:

```
tmode -upc
```

OS-9 now displays lower-case characters. The Color Computer displays upper-case characters as dark letters on a light background. Lower-case letters display in reverse mode, that is, light letters on a dark background.

This manual shows all commands and file names in lower-case and directory names in upper-case.

**Note to Two-Drive Customers:** The examples in this chapter specify Drive 0. You can use Drive1 by specifying /D1 instead of /D0 as shown.

To see the contents of the OS-9 System disk's root directory, type the following at the OS-9 prompt:

```
dir /D0 (ENTER)
```

OS-9 displays:

```
DIRECTORY OF . 00:27:37
OS9Boot  CMDS  SYS
DEFS      startup
```

This shows the first level directory on the OS-9 System disk. To see an example of a second level directory, look at the CMDS directory. Type:

```
dir /D0/CMDS (ENTER)
```

OS-9 lists the contents of the CMDS directory. The CMDS directory contains all the commands for OS-9.

OS-9 uses "pathnames" to locate files and directories. Pathnames describe the path to be taken. For example:

```
/D0/CMDS
```

---

tells OS-9 that “CMDS” is located in the D0 device directory. Look at this pathname:

```
/D1/MYFILES/testProg
```

OS-9 looks for the file “testprog” in the directory MYFILES which is a subdirectory of device /D1. We know that “testprog” is a file because it is shown in lower-case letters.

You can position yourself in another directory by using the Chd command. For example, to move to the DEFS directory, type:

```
chd /D0/DEFS (ENTER)
```

Now display the directory, using the Dir command:

```
dir (ENTER)
```

The Dir command always lists the contents of the current directory if another is not specified (for example dir /D0/CMDS). Therefore, OS-9 displays the contents of the DEFS directory.

If you can’t remember which directory you are in, you can find out with the Pwd command (print working directory). Type:

```
pwd (ENTER)
```

OS-9 tells you that you are in the /D0/DEFS directory. Move back to the /D0 root directory by typing:

```
chd /D0 (ENTER)
```

## Creating and Deleting Your Own Directories

Now that you’ve seen some OS-9 files and directories, you probably want to know how to create — and delete — your own.

---

## Creating Directories

You use the `Makdir` command (make directory) to create directories. For example:

```
makdir BUSINESS (ENTER)
```

creates a directory in the current directory (/D0) called BUSINESS. You can use the `Dir` command and see that BUSINESS has been created. (Remember, we recommend using all upper-case letters for directory names.)

You can create directories to organize your files by projects, applications, users, and so on. Here are some sample directory names:

DEE	PAYROLL	GROSS.SALES.TEXAS
X10.PROJECT	TESTFILES	JIMS.FILES

You can also create subdirectories (directories that reside in another directory). For example:

```
makdir /D0/BUSINESS/PAYROLL (ENTER)
```

creates a directory called PAYROLL in the BUSINESS directory.

## Deleting Directories

To delete a directory, use the `Deldir` command (delete directory). If you want to delete the PAYROLL directory, type this command:

```
deldir /D0/BUSINESS/PAYROLL (ENTER)
```

OS-9 asks:

```
LIST DIRECTORY, DELETE DIRECTORY,  
OR QUIT ?  
(L/D/Q)
```

Type **(D)** **(ENTER)** to delete the directory. OS-9 deletes all files in the PAYROLL directory and then deletes the PAYROLL directory.

---

## Important Notes about Deleting Directories

Keep these points in mind when deleting directories:

- Before you delete a directory, be sure to move all important files to another directory or you will lose them. **The Deldir command removes all files in the directory being deleted.**
- All sub-directories of the directory being deleted will be lost.
- You cannot position yourself in a directory that is being deleted. This includes subdirectories of that directory. Position yourself in a directory higher in the hierarchal tree (use the Chd command to reposition).

---

## Creating and Manipulating Files

Although you will normally create files with application programs, you can use the Build command to create simple files. To start the file, type:

```
build /D0/BUSINESS/file1 (ENTER)
```

This creates a file called “file1” in the BUSINESS directory. The screen shows a question mark (?) indicating that OS-9 is waiting for you to insert information into the file. Type the following:

```
? This is the first file that  
? we created.  
? (ENTER)
```

The (ENTER) on the last line tells OS-9 to end the file and return the OS-9 prompt. The Dir command shows the new file:

```
dir /D0/BUSINESS (ENTER)
```

Use the List command to display the contents of the file. For example:

```
list /D0/BUSINESS/file1 (ENTER)
```

displays the following:

```
This is the first file that  
we created.
```

The Copy command lets you duplicate a file. To duplicate /D0/BUSINESS/file1 to the file /D0/BUSINESS/file2, type:

```
copy /D0/BUSINESS/file1 /D0/BUSINESS/  
file2 (ENTER)
```

This tells OS-9 to create a file called “file2” and copy the contents from “file1” to “file2.” The first file (file1) is left untouched. To see exactly what the Copy command accomplished, list the contents of “file2”. Type:

```
list /D0/BUSINESS/file2 (ENTER)
```

---

OS-9 displays:

```
This is the first file that  
we created.
```

Notice that “file2” is indeed a copy of “file1.” You can also copy a file to another directory. For example:

```
copy /D0/BUSINESS/file1 /D0/file1 (ENTER)
```

copies the file /D0/BUSINESS/file1 to file /D0/file1. Even though the filenames are the same, the files are unique because their pathnames are different. Use the Dir command to see that “file1” exists in both directories.

OS-9 also lets you rename files:

```
rename /D0/file1 samplefile (ENTER)
```

This command changes the filename /D0/file1 to “samplefile.” It is important to note that this does not duplicate the file, it simply changes the name. Therefore the file /D0/file1 does not exist after the above command is executed. Try listing /D0/file1:

```
list /D0/file1 (ENTER)
```

OS-9 returns an Error #216, which means that OS-9 could not find the file. Now list /D0/samplefile:

```
list /D0/samplefile (ENTER)
```

and OS-9 shows you its contents:

```
This is the first file that  
we created.
```

Remember, if you want to duplicate a file, use the Copy command.

You can also delete files by using the Del command. To delete the file /D0/samplefile, type:

```
del /D0/samplefile (ENTER)
```

and OS-9 deletes “samplefile” from the /D0 directory.





# 6/ In Case Of Trouble . . .

---

OS-9 tells you if an error has occurred. Most errors are the result of making a mistake while entering the command, such as misspelling a command or omitting a parameter.

When an error occurs, OS-9 displays error messages similar to this:

```
ERROR #216
```

The number represents a specific type of error. This type of message, however, does not explain the problem. To print a descriptive message when an error occurs you can use the OS-9 `Printerr` command. To activate this command, type:

```
Printerr (ENTER)
```

Now OS-9 displays errors like this:

```
ERROR #216  
- PATHNAME NOT FOUND
```

The OS-9 error messages fall into three categories: operator, hardware or software.

An **operator error** tells you that you are asking the computer to do something it can't do.

Perhaps the most common error is typing a command incorrectly. For example, suppose you type this `Dir` command:

```
dir (ENTER)
```

OS-9 gives you this error message:

```
ERROR #216  
- PATHNAME NOT FOUND
```

---

You simply need to type the command again, spelling it correctly:

```
dir (ENTER)
```

Another common operator error is trying to store too much information on a disk. For example, if you are in the middle of storing information and run out of disk space, OS-9 warns:

```
ERROR #248  
- MEDIA FULL
```

Either use another disk or delete some files and/or directories, thereby, freeing disk space.

A **hardware error** warns you of a hardware problem, usually a flawed disk or a faulty disk drive. For example, if you tell OS-9 to display the directory (Dir command), and the disk was formatted with TRSDOS, the Color Computer Disk System's Operating System, OS-9 displays the message:

```
ERROR #241  
- SECTOR ERROR
```

Repeat the command, using an OS-9 formatted disk. Remember, OS-9 can't read Color Computer Disk System's disks. OS-9 can read only those disks formatted by OS-9.

Other hardware errors may occur such as write or read errors. Always try another diskette first. If the problems continue, contact your Radio Shack Service Center.

A **software error** warns you of a problem in your application program. For example, suppose your application program tries to open a file in a directory where a file by that name already exists. OS-9 displays the message:

```
ERROR #218  
- FILES ALREADY EXISTS
```

---

## Automatic Printerr Routine

You will probably find it more helpful to have OS-9 print a descriptive error message by using the Printerr command. Normally the Printerr command is only active until you reset/reboot the system.

To make it automatic on your OS-9 system, you can add the Printerr command to the “startup” file. Follow these steps:

1. Display the “startup” file, by typing:

```
list /D0/startup (ENTER)
```

Write down the contents. If you have a printer, you can redirect the listing to it by typing:

```
list /D0/startup >/P (ENTER)
```

2. Rename “startup” to a temporary file:

```
rename /D0/startup startup.temp (ENTER)
```

3. Create a new startup file:

```
build startup (ENTER)  
?
```

OS-9 is now ready to build a new “startup” file. First, enter the lines that you copied from the original file. Then add these lines:

```
echo (ENTER)  
Printerr (ENTER)  
echo Print Error Routine Now Active  
(ENTER)  
(ENTER)
```

These lines activate the Printerr routine and print a message that the Print Error Routine is now active. The (ENTER) on the line by itself tells OS-9 to end the file.

4. Press the reset button to load the new “startup” file.

Now, Printerr is a permanent part of your startup file.



# 7 / AND THERE'S MORE . . .

---

You've just begun to scratch the surface of OS-9. This chapter discusses some of the other ways you can use OS-9, through more commands, concepts, and programs that are becoming available.

## More Commands

The following summarizes some useful OS-9 commands:

### **copy — single drive (-s option)**

Copies a file from one disk to another using only one drive. For example:

```
copy /D0/BUSINESS/file1 /D0/newfile -s  
ENTER
```

Copy alternately prompts you to ready the destination or source disk and press **C** to continue.

### **date**

Displays the current system date. If you specify the **t** option, the OS-9 also displays the time. For example:

```
date ENTER
```

displays the current system date,

```
date t ENTER
```

displays the current system date and time.

## **free**

Tells you the amount of free space remaining on a disk. OS-9 displays the name of the disk and the date it was created. Next, it displays the total capacity of the disk (in sectors — a sector is equal to 256 bytes or characters), the number of unused sectors, and the largest block available. (A block is an area of contiguous sectors.) Type:

```
free (ENTER)
```

and OS-9 displays the amount of free space on the disk in Drive 0 by default. To see how much memory is free on the disk in Drive 1, type:

```
free /D1 (ENTER)
```

## **mfree**

Displays the amount of available memory in your OS-9 system. The screen displays the amount as “pages” of memory. A page is equal to 256 bytes. The address is shown for each contiguous set of pages as well as a total for the pages available. To see how much memory is available in your system, type:

```
mfree (ENTER)
```

## **setime**

Lets you set the system time and date. Type:

```
setime (ENTER)
```

and OS-9 prompts:

```
YY/MM/DD HH:MM:SS  
TIME ?
```

---

To set the date as March 19, 1983, at 4:15 PM, enter:

83/03/19 16:15 **ENTER**

The seconds are optional.

For more information on OS-9 commands, see *OS-9 Commands*.

## Command Modifiers

OS-9 offers a way for you to customize commands for your needs. You can add modifiers to almost any command line. The following briefly explains these modifiers.

**Alternate Memory Size.** You can specify the amount of memory to be set aside for the command by using the number sign symbol (#). Very often this speeds up execution of a program.

**I/O Redirection.** These modifiers let you reroute a program's standard I/O paths to alternate files or devices. For example, a program that normally displays to the screen can easily output to the printer instead without changing the program and vice versa. The I/O redirection modifier symbols are <, >, and >>.

**Concurrent Execution.** You can run two or more programs at the same time. The ampersand (&) tells OS-9 to start running that program and display another prompt. At that time you can start another program to run at the same time as the first.

**Pipes.** Pipes transfer data between programs. The output of program1 becomes the input for program2. The exclamation point (!) symbolizes a pipe.

For more information on OS-9 assembly language and system calls see the manual, *OS-9 Technical Information*. For information on OS-9 high-level languages, check with your Radio Shack dealer.

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## OS-9 Languages

OS-9 lets you use a number of different languages that were previously not available for the Color Computer.

The **OS-9 Assembler** comes with your OS-9 system. It lets you write assembly language programs in 6809 code for your OS-9 system.

**High Level Languages** can also be used with OS-9. New languages are constantly being developed, such as BASIC and Pascal.

**OS-9 System Calls** can be used for easy communication between your assembly language program and OS-9.

For more information on OS-9 assembly language and system calls see the manual, *OS-9 Technical Information*. For information on OS-9 high-level languages, check with your Radio Shack dealer.

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